Vereins Kirche—Museum at Fredericksburg — *E. M. Schiwetz*

The HUMBLE WAY

NOVEMBER-DECEMBER, 1950

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Supervisors review

Fundamentals of Supervision

Fundamentals of Supervision conferences are bringing together Humble supervisors from California to Florida for an uninterrupted week of sharing experiences, exchanging ideas, expressing opinions, discussing common problems, and getting better acquainted. Some 2,850 supervisors are expected to attend the meetings before the current series is brought to a close sometime in 1951. Thereafter, the conferences will be held as often as the need indicates.

Stated simply, the purpose of the conferences is to allow each man a chance to equip himself with what he needs to become a better supervisor.

In a very real sense, the conferences are examples of "the Humble Way" in action—based, in this case, on the bedrock truth (as Humble sees it) that *training is a function of management*. In fact, the way the conferences were conceived and set up reflects the Company's firm convictions about training in general. To be specific, the conferences were not *offered* by the Training Division; they were *requested* by members of management, many of whom had previously attended the conferences on administrative management. When the time came to prepare material for the conferences, the Training Division did not attempt to make a shoe that would fit all feet. Foundation material was made *so flexible* that each group in each area could tailor the conferences to fit individual needs.

The method of carrying on the Fundamentals conferences is marked by *decentralization*. Everything is left up to management in the various divisions. For example, a sort of "steering committee" in each area is made up of the division managers (for Production, Exploration, Sales, Pipe Line, and Refining). Coordination is handled by the Employee Relations Manager in the Division.

Work began on suitable conference material as early as 1947. The material was carefully developed and tested for the first time in December, 1949, when it was subjected to a severe and critical appraisal by a combined group from Houston and Baytown. In April of 1950, the conferences were presented in a complete "full dress" run at the Sales Department's Specialty Manufacturing Plant in Houston.

After the material was reviewed by field management, revised, and finally approved by the Board of Directors in June, 1950, management's job was to provide a large number of competent leaders, so the conferences could be presented simultaneously in all divisions. Here again, decentralization was the pattern. Managing committees in each area chose the men who would act as leaders *in that area*. In choosing these leaders, it was not a question of picking a man who could be easily spared from his regular duties; it was a matter of following the truism that "if you want a good job, get a busy man to do it."

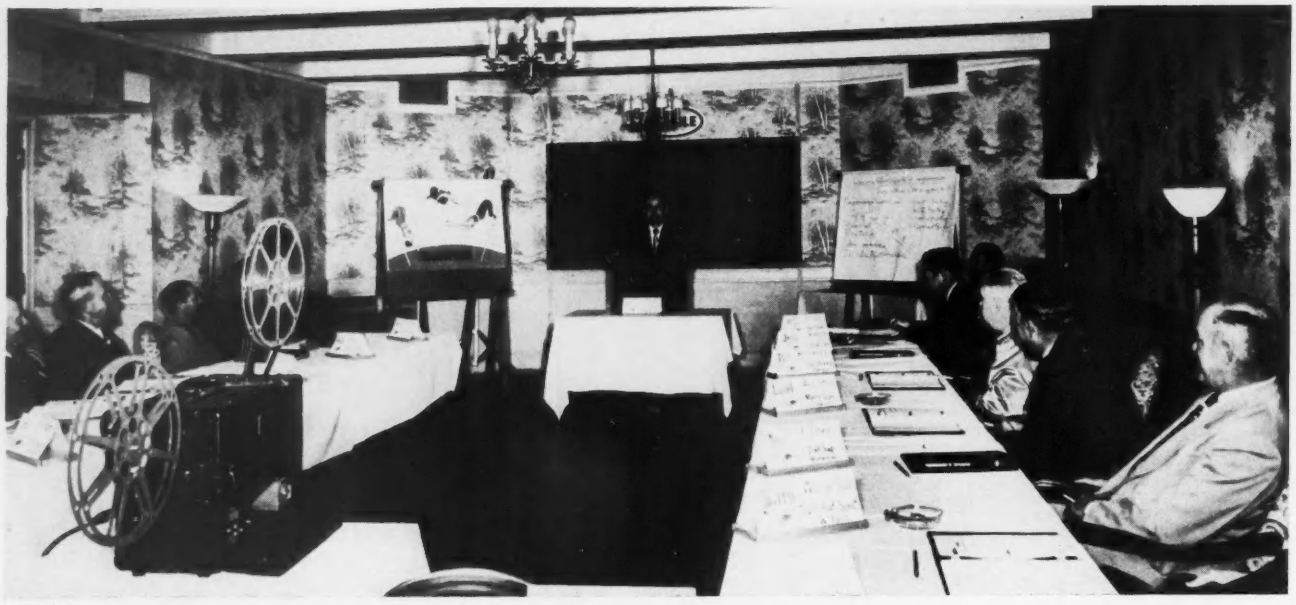
From many different kinds of work the leaders came—such men as division petroleum and civil engineers, geologists, assistant division superintendents and district superintendents for Production and Pipe Line, assistant chief accountants, assistant division sales managers, operating and technical supervisors at Baytown Refinery, and so on. In all, some 60 men were groomed for their important tasks.

Brought to Houston in four groups for an intensive two weeks' work, the "teachers-to-be" attended first a course in conference leadership. This was followed immediately by the Training Division's presentation of the material suggested for use in the Fundamentals of Supervision conferences. Finally, the leaders themselves took a "trial run" at the material, under the observation and guidance of the Training Division.

Fundamentals of Supervision conferences began in the field soon after the leaders had returned home. The first sessions were opened in Houston on October 2; Baytown began its meetings the following week, followed by Tyler, Midland, Corpus Christi, Abilene, and New Orleans.

Each week's course of conferences is opened with a welcome and short introductory remarks on the need for effec-

Marsh buggies transporting members of a Humble seismograph party churn their way out of an open waterway into the grass-covered mud of a Southern Louisiana marsh.



Conferences at Abilene show a typical physical set-up used at the six other points where the conferences are in session. Every effort is made to make the conferees comfortable, with plenty of proper lighting, equipment. Visual aids help drive points home.

tive supervision by some division manager in the area. Then, appropriately enough, the conference leader takes over and presents material covering the Company's origin and development. This is no hurried sketch or glossed-over account. It is probably the most complete and comprehensive tracing of the Company from its beginning to the present that has yet been brought together in one place. Keynoting the material are such fundamental policies and attitudes as top management's declaration long ago that: "A corporation justifies its existence and endures only if it performs a worthwhile service. In order to fulfill its mission and to endure, a corporation must be fair and square in its dealings with the public, with its competitors, with its stockholders, and with its employees."

Having drawn from the opening session some knowledge of the men and policies responsible for Humble's growth, the group takes up the subject of the *supervisory team*, which leads logically into a session on "The Job of Being a Supervisor."

Among other things, the "supervisor's job" sessions point out that a good supervisor is made up of a number of arts and skills—that he must be able to get along with people, train people, control costs, handle grievances, teach safety, and set a good example for safe work himself, use and maintain equipment properly, build morale, and be a good leader generally. Everything is based on Humble's longtime policy of sound practices and fair dealing.

Having established that a supervisor has much to do, the conference next takes up the matter of "Tools of the Supervisor." Generally, these are accepted to be the various *skills* that the supervisor uses in performing his job—skills with men, money, machines, planning, knowledge of Company policies, and the like. But it is also pointed out that the supervisor has other tools at his disposal in the form of staff services—help from employee relations men, safety engineers, laboratory technicians, clerks and accountants, Company libraries, manuals and pamphlets prepared within the Company, and a host of other sources. It is emphasized that proper use of these tools will lighten the supervisor's burden.

Sessions V and VI have a strong employee relations flavor, being parts 1 and 2 of a subject called "Job Relations." In them are discussed case histories of relations between supervisors and supervised. Members of the conference, after reviewing the cases, are invited to discuss them and outline what each would have done under similar circumstances. Visual aids, including a thought-provoking movie about a shop foreman who was having difficulty getting at the root of his production troubles, help drive home useful lessons about the right kind of job relations.

A session on the induction of new employees redefines the supervisor's duties and responsibilities in that direction. Everything is slanted toward getting the new man off to a good start.

Midway in the week, time is devoted to the elements of job instruction—defined simply as "teaching a man to do a job." In this, the accepted philosophy is that "if the learner hasn't learned, the teacher hasn't taught"—which puts the burden for job training squarely on the supervisor's shoulders. Some sound points are made, the job-breakdown method of teaching is outlined, and each member of the conference takes his turn at teaching some other member to do one job. Some well-directed showmanship helps make this one of the most lively, interesting, and useful sessions of the week. The conclusion is reached that *showing* or *telling* a man how to do a job is not enough in itself. It takes a *combination of showing and telling and following up* to get good results.

Sessions on the function of the supervisor in planning and directing work are usually followed by a talk from one of the safety engineers in the area. In taking up the matter of the supervisor's responsibility for safety, the engineer begins with a brief outline of the development of safety consciousness in industry. The causes of accidents, and means of reducing them, come in for a major share of study. The group shows much pride in the Company's 1949 safety record (lowest in

Time out for coffee is a welcome break in the morning sessions. Coffee helps stimulate discussions about the morning's work.

Job-Instruction Sessions, where one conferee shows another how to do a job new to him, are among the most lively the confereences have to offer. Above and below, supervisors try their hand at the job-breakdown method of showing a man how to do a job.

Humble's history and much lower than for industry as a whole), but it is left with suggestions for making future safety records still better.

Other guest speakers appear before the week is over. One emphasizes the importance of each man's responsibility for maintaining good public relations. Another, with the help of visual aids showing how our business system works, gives a condensed talk on fundamental economics outlining the interdependence of management, employees, stockholders, and customers. A member of the Employee Relations Department reviews salient features of Humble's Annuities and Benefits plans for employees for the purpose of emphasizing the supervisor's responsibilities in the administration of those plans. At the close of each special talk, time is allotted for a questions-and-answers period. Questions flow thick and fast as members of the conference clear up this point and that.

On the afternoon of the fifth day, the conferences are closed, as they were opened, by a member of management. Each supervisor attending receives a certificate in recognition of his week's work.

It is obvious, even to the most casual visitor, that the Fundamentals of Supervision conferences are doing the job for which they were intended. The eagerness and interest of every conference member; the lively and enlightening discussions that are part of every session; the caliber of the conference leadership; the sustained enthusiasm with which the men tackle every phase of the work—all are unmistakable evidence of the way the conferences are being received. Favorable comments from those who have attended abound by the scores. One man sounded the key to this when he drawled, in all seriousness: "I didn't think there was anything that could sit me down for six hours a day, five days straight, and keep my interest. But, brother, this course took hold of my interest and wouldn't let it go. You know why? All this material was talking about *me;* about things *I* can use. It's going to help me be a better supervisor."

FLYING TAXI of the Marshlands

Helicopters Have Lifted Seismograph Crews Out of the Mud and Revolutionized Operations

STANDING ankle-deep in the soft mud of a Southern Louisiana marsh, the hip-booted members of a Humble seismograph party drilling crew were nearing completion of their third shot hole. Suddenly the small pumper engine coughed warningly and stopped. The driller bent over it for a few minutes, then shook his head. "She's got to go back to the shop for a new part," he said.

Ordinarily, a breakdown like this occurring in the marshlands might mean the end of work for that day. The drilling site was a good five miles from the quarter boat which served as headquarters for the exploration party. And, while five miles is an inconsequential distance to travel on solid ground, here in the marshes it would be a three hour trip by marsh buggy and boat.

This drilling crew, however, did not have to depend upon ordinary means of marshland transportation. Within a few minutes after the breakdown of the engine, the noise of another engine was heard, and skimming through the air a hundred feet above the tall marsh grasses, a helicopter hove into view. The driller waved his arm, and the pilot eased the machine down until it came to rest on its cushiony pontoons beside the crew. After a brief explanation, the driller put the ailing engine aboard the helicopter and climbed into the vacant seat beside the pilot. Twenty minutes later, the equipment was being repaired in the shop at the quarter boat. The repair job was quickly completed, and the engine was flown back to the drilling site. The entire loss of time was less than two hours.

To members of Humble's seismograph party No. 10, the routine appearance of the low-flying helicopter over their position in the marshes is normal procedure, and not a matter of unusual interest. The "flying windmill" has been adopted by these marshland explorers as standard transportation equipment, comparable in usefulness to the indispensable marsh buggy.

Transportation has always been the major problem for men who search for oil in the marshlands. Most of the surface is neither land nor water but a slurry mixture of both. Ordinary wheeled vehicles are useless in this soggy terrain, and travel by boat is limited to the numerous open waterways. Only the marsh buggies—curious conveyances built on drum wheels that float in water and roll across mud—can negotiate the treacherous surface of the marshes. These are the work horses of the seismograph crews.

But the marsh buggies are necessarily slow, and as the crews work their way farther out into the marshes away from their base, the problem of traveling time becomes acute. A crew operating four or five miles from the quarter boat base may spend more time each day getting to and from work than actually at work.

Fishbowl-like cockpit seats three people. Flight instruments are centered at front.

For seismograph party No. 10, the helicopter has provided a practical solution to that problem. The bizarre flying machine has literally lifted the crews out of the clinging mud of the marshes, and has revolutionized their methods of operation.

Primarily, the helicopter serves as an aerial taxi for members of the various crews of the seismograph party. Two by two, it flies the men from the quarter boat base each morning, and brings them back from the marshes each afternoon. The marsh buggies, left in the marsh each night, are ready to go to work without delay when the men return next morning.

Usually, it takes about an hour for the helicopter to ferry all the men to work. Then it spends the remainder of the day making constant routine flights over the area of operations, maintaining contact with the crews in the marshes and the party chief at the quarter boat. From time to time, the mud-bound workers flag down the helicopter on its routine flights to help with some problem or to run an errand. The engineers may call on the flying machine to drag their surveying chain across a particularly difficult stretch of marsh. When the shot hole drillers are using hand-drilling equipment—as they frequently do for shallow holes—the helicopter moves the crew and its equipment from point to point, eliminating the need for a marsh buggy. At intervals during the day, the pilot picks up seismograph records from the instrument man and delivers them to the computer at the quarter boat.

Hovering low over marsh buggy and instrument cab of seismograph crew in marsh, the helicopter resembles a huge dragonfly. Soft pontoons enable the flying machine to land on water, barge deck, or mud. 'Copter cuts travel time from hours to minutes.

The helicopter's ability to land on almost any surface larger than the span of its own whirling blades has also proved a boon to the seismograph party's permit man, who must obtain permission to explore from holders of trapping rights as well as landowners. Formerly, if the permit man found the trapper was out in the marshes when he called at his house, there was no recourse but to await his return. Now, however, the permit man finds out in what general area of the marsh the trapper is working, then locates him from the air by helicopter, lands beside him, and completes the negotiations without delay.

In the few months since the helicopter was introduced into its operations, seismograph party No. 10 has been able to increase by one-third to one-half the average number of tests shot each day. And new uses for the machine are being discovered constantly. The "cop-cop," as it is called by the men of the crews, has proved a valuable team mate for the marsh buggy in the difficult job of exploring the marshlands.

Waiting for drilling crew to finish packing gear for flight to next drilling site, helicopter stands idle in tracks made through marsh grass by engineers' marsh buggy.

SEISMOGRAPH PARTY
in Southern Louisiana

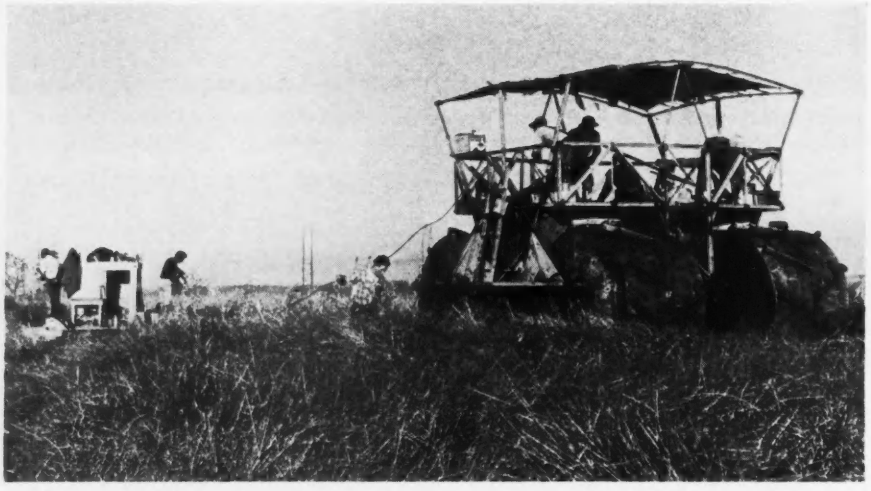
1. **In tracks** made by engineers' buggy drillers prepare to drill shot hole.

Members of Humble Seismograph Party No. 10 live and work under unusual conditions. They sleep and eat on a boat, fly to and from work in a helicopter, and wear hip boots instead of shoes on the job. Theirs is not an easy task, but it is an important one. Their work is to drill holes into the soggy marsh, set off explosive charges in the holes, and record the vibrations that are reflected from hard formations far below the surface. When properly interpreted, these seismograph records reveal clues to possible areas where oil and gas may have accumulated.

This is one of three seismograph parties doing similar exploration for the Company in lower Louisiana.

From marsh buggy deck trapper-guide shows engineer how to avoid muskrats.

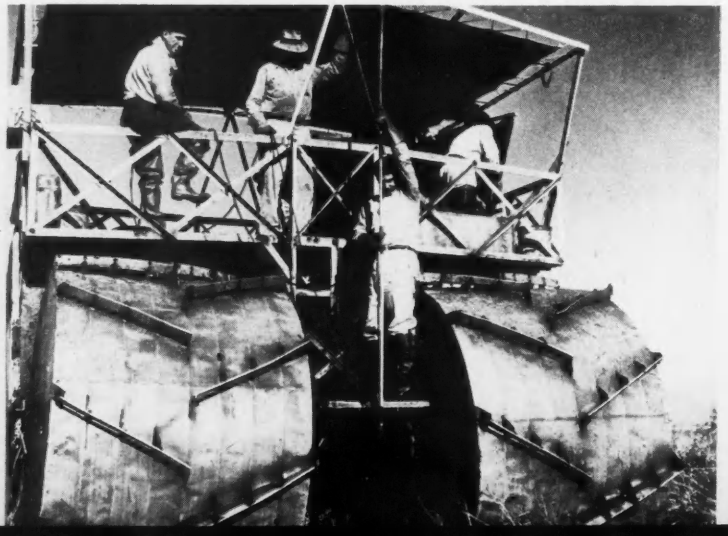
2. **Drilling crew** uses light equipment for shallow holes; moves it by helicopter.



3. **Seismograph instrument cab** is mounted on pontoon skids, pulled by marsh buggy. Sensitive instruments record underground reflections picked up by geophones.

4. **Shooting crew** prepares a charge of explosive to be lowered into hole and set off to create vibrations.

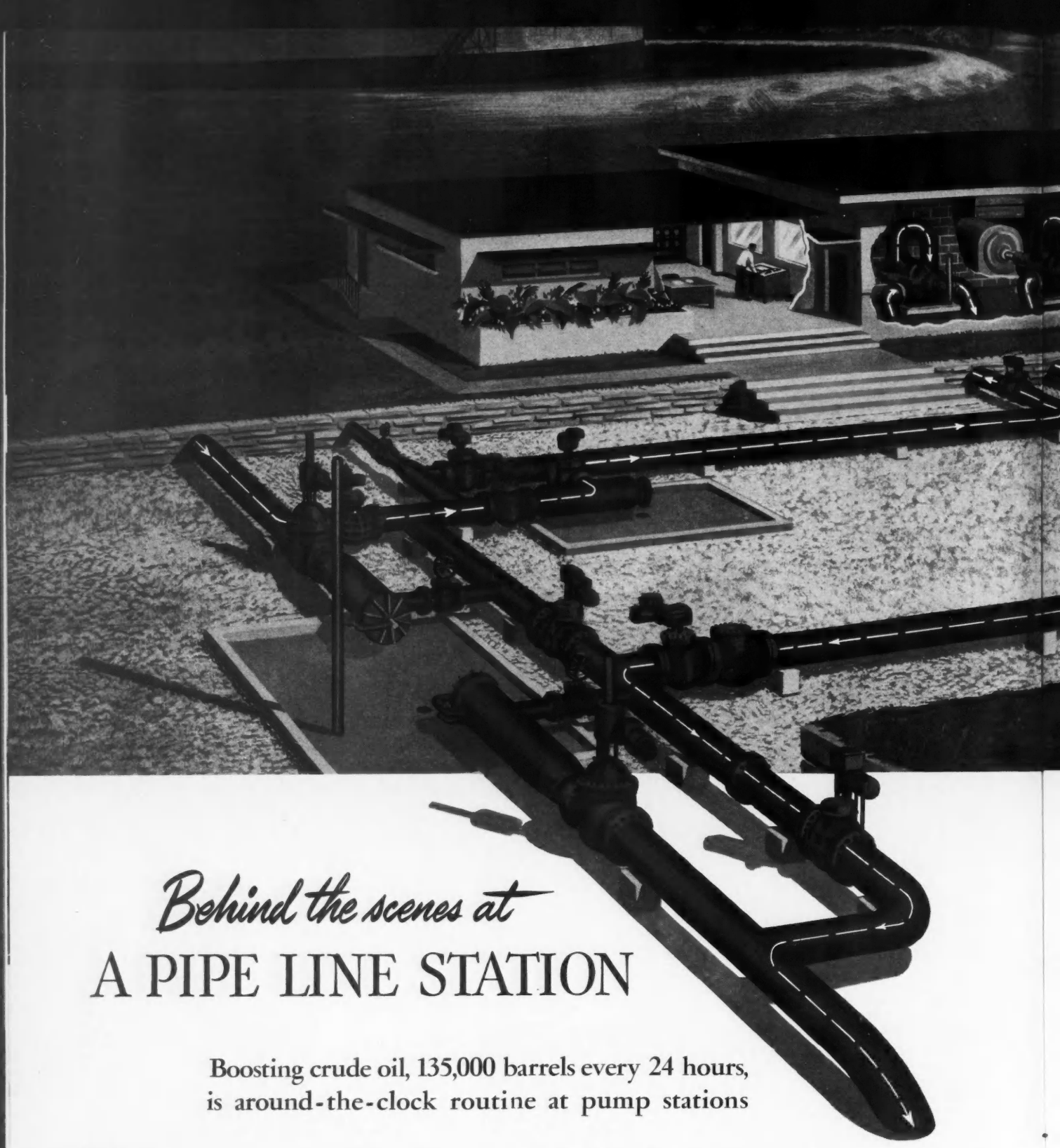
5. **A pickup geophone,** one of several attached to cable from instrument cab, is planted firmly into mud by crew member on marsh buggy.



6. **Geyser of water and mud** erupts as explosive charge is set off in bottom of hole. As vibrations from this shot bounce back from hard formations far below, they are picked up on the geophones in a split second and recorded by seismograph.

7. **Helicopter picks up** seismograph records from instrument crew at intervals during day and flies them to headquarters on the quarter boat. Records are made on photographic paper strips and developed and dried by the instrument man at site in the marsh.

8. **Computer and the party chief** examine seismograph records in the office on quarter boat. By interpreting the lines recorded by the seismograph instruments, computer can prepare a cross section of area tested. This cross section is later developed into contour map.



Behind the scenes at

A PIPE LINE STATION

Boosting crude oil, 135,000 barrels every 24 hours, is around-the-clock routine at pump stations

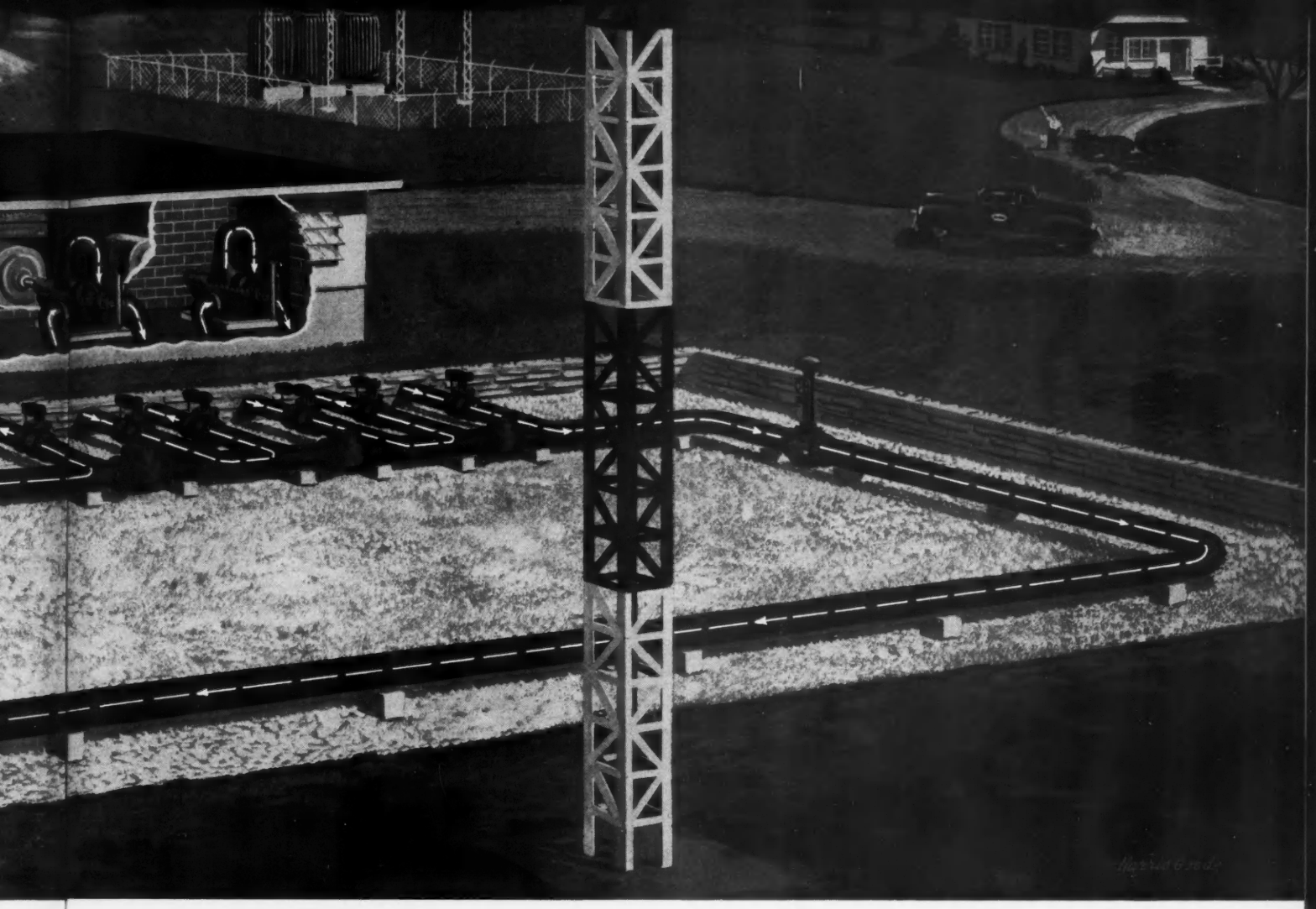
TODAY'S pipe line stations which speed oil from scattered producing areas to refineries or to tanker terminals for shipment are marvels of efficiency by comparison with those of 20 years ago.

Relatively small, compact centrifugal pumps driven by high speed electric motors are taking the place of huge reciprocating pumps powered by bulky diesel or gas engines.

These advancements in equipment have made possible also the evolution of pump station buildings. Today's compact stations, built of brick and glass, reflect the best in modern functional design.

"Push button" control is now more than a mere term; it is a reality. From a lighted control panel the station engineer can start motors and pumps, open and close valves, and control the flow of oil by simply pushing buttons. Rate of flow recorders and pressure gauges are right before his eyes.

To understand these simplified operations and to see the pump station's part in moving oil, follow artist Harris Goode



who made the drawing above. He visited the new Warda Station, one of three nearing completion on Humble Pipe Line Company's new 18-inch line from West Texas to Satsuma, near Houston. He learned that the three new stations—Fort McKavett, Eckert, and Warda—boost the 370-mile line's capacity by about 50 per cent—from 85,000 to 135,000 barrels a day.

West Texas crude oil from Wasson, Yates, McCamey, or any of a dozen other fields, comes into Warda Station from Eckert Station 115 miles away at the rate of about four miles an hour. Upon arrival through the line at the extreme left of the drawing it passes through a network of valves (gates to pipeliners) at the station. The oil makes a turn, as indicated by the arrows, and passes through a strainer before entering the pumps. Through electrically operated valves it enters the first of two pumps, each driven by a 1,000 horsepower motor. As each pump adds pressure the oil moves in a loop out in front of the pump house and returns to the main line. Oil that comes in at four miles an hour and 25 pounds per square inch pressure, leaves at four miles per hour and 800 pounds pressure.

Flow is controlled by the tall valve at the extreme right. It opens and closes automatically to meet varying line conditions due to temperature changes in the oil stream or to differences in the grades of oil pumped.

Most of the time, that's the story at Warda and the other stations: just the hum of motors and pumps, and routine checks on equipment. The stations keep pumping around the clock, and one of three engineers is on duty each eight-hour shift. The chief engineer lives in the house, upper right, so as to be always available in the event of trouble.

Instructions on oil movements come to the engineers from the chief dispatcher in Houston via a static free micro-wave radio system nearing completion on the line (radio tower, right foreground).

Warda Station simply boosts the oil on its way. It operates on what is known as a closed system. That means oil keeps flowing through the line without being diverted into tanks. The lone 30,000-barrel tank, upper left, is used for relief only—a place to receive oil in the event a gate is closed against the stream.

About every 30 days a scraper or "pig" is run through the line to clean it. This tool with its sharp blades fits snugly into the line and is pushed along by the oil pressure.

Valves on the incoming line are so arranged that the "pig" moves into the scraper trap near the post, lower left, and is removed there with the basic sediment and scale it has scraped from the inside of the line. The same process is continued through each section of the line, with a new scraper being inserted when necessary.

Humble's modern pump stations, though compact and comparatively simple to operate, are vital elements in moving Texas' oil to the great refining centers of the Texas Gulf Coast.

A new Diesel-electric locomotive pulls one of the nation's crack passenger trains out of a large metropolitan terminal.

Revolution on Rails

Dieselization of American railroads is the most significant trend in motive power development today

Diesel fuels refined from oil have improved railroad transportation. To the railroads, Diesel-powered locomotives mean greater efficiency and economy than steam locomotives. To travelers, they mean a smoother, faster, more comfortable ride.

THE FIRST Diesel engine was built in 1892, but exploded when its inventor, Dr. Rudolph Diesel, tried to start it. Five years later, Dr. Diesel built his first successful engine, and the world was properly impressed. In the search for more mechanical power, engineers of that age were looking for something with greater efficiency than the old steam engine. The Diesel engine proved to be the answer. At first, it burned powdered coal blown into the cylinder by compressed air; later it turned to liquid fuel refined from petroleum.

Early Diesel engines were large, heavy, slow things suited primarily to stationary power plants and large boats. Other uses were devised as the Diesel was improved and made smaller and more powerful. It was the Diesel engine that made submarines possible.

Easily the most dramatic and significant application of Diesel power in our time has been the use of the engine to move the fast, streamlined passenger and freight trains of American railroads. This is a fairly recent development, dating back hardly more than a decade or two. In fact, the Diesel first really proved its merits in high-speed train service when Burlington made its famous run from Denver to Chicago in 1934 with a 600-horsepower engine installed by the Electro-Motive Division of General Motors.

Sharply at 5:05 on the morning of May 26, 1934, the first Diesel-powered mainline motor train in the history of American railroading pulled out of Denver to try a dawn-to-dusk run to Chicago's Century of Progress Fair. Appropriately named the *Pioneer Zephyr,* the train was unlike

anything ever seen before in this country. Three sleek cars, glistening in stainless steel, were whisked along by a snub-nosed locomotive powered by Diesel oil instead of the traditional steam generated from fuel oil or coal. Everywhere along the route people stared, eyes wide with wonder, at the streamlined monster.

It was no ordinary job the *Pioneer Zephyr* had cut out for its new Diesel locomotive. It had boldly advertised that it would make the 1015-mile run between Denver and Chicago in 14 hours, 12 hours faster than the previous record set by a steam-powered train! At the end of the trip, if all went well, the *Zephyr* was to pull up on a stage as part of the "Wings of a Century" pageant on the fairgrounds.

Exactly 13 hours and 5 minutes after the *Pioneer Zephyr* had left Denver, after a number of unforeseen troubles had been overcome along the way, it broke a ribbon stretched across the track in Chicago. A few minutes later it pulled up on the "Wings of a Century" stage in front of a cheering crowd. Average time for the 1015-mile trip had been 77.6 miles an hour! The old Iron Horse had sprouted wings; the dawn of a new era in railroading was at hand!

In spite of the dramatic run, there were few indeed who dared predict that Diesel locomotives would one day take over the rails. Many railroad men were downright scoffers. One old-line steam locomotive manufacturing company went so far as to run an ad in a trade paper. Under the heading, "We Go On Record," the ad declared that steam had dominated the rails for more than 100 years and would continue to do so for "a long, long time to come," in spite of "experimentation."

But Diesels were on the move, and nothing could stop them. In October, 1934, just a few months after the *Pioneer Zephyr's* run from Denver to Chicago, Union Pacific's *M-10001* made a record-breaking run across the continent from Los Angeles to New York in 56 hours, 55 minutes.

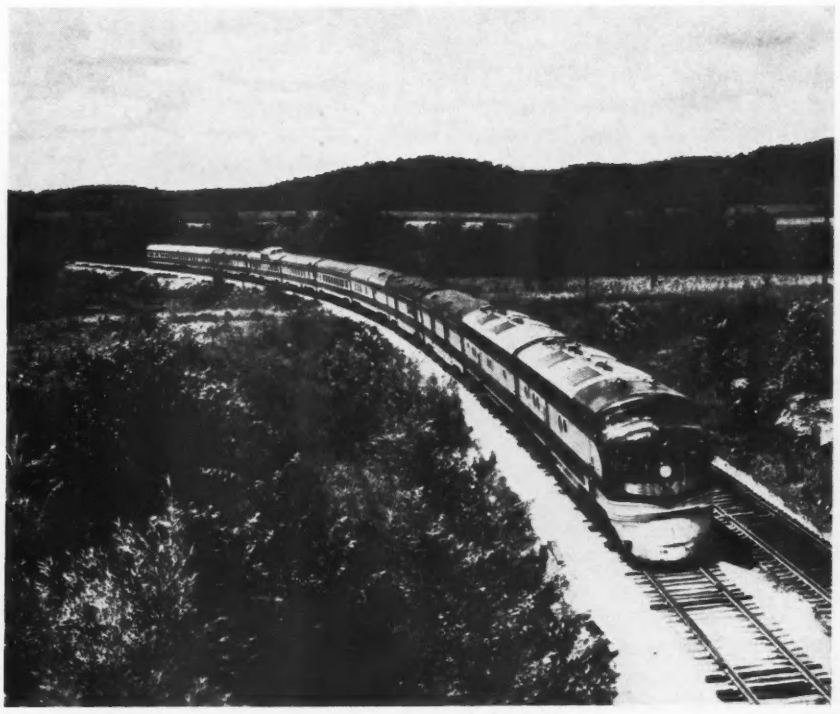
While the development of the Diesel engine was a boon to the railroads, it created new problems for oil refineries. Fuel oil used to generate steam for steam locomotives was a relatively low-quality by-product of refining operations. Diesel fuel, to meet exacting requirements, had to be a carefully *refined* product. By comparison with fuel oil, it is lighter, contains less sulphur, is less viscous, and is of a much higher quality generally.

The oil refiner's problem of providing proper lubricants and greases for railroad Diesels was even greater than his problem of manufacturing proper fuels. Diesel engines, in contrast to steam engines, are precision machines. Being precision built, they raised a number of lubricating problems that had not been raised before—entirely new products had to be manufactured to meet specific needs. Refinery research men worked closely with railroads to make better, higher quality lubricants and greases than had ever been used in that service before. Here again, however, the Diesels proved their economy; they used higher quality products, but they used *less of them than they had before.*

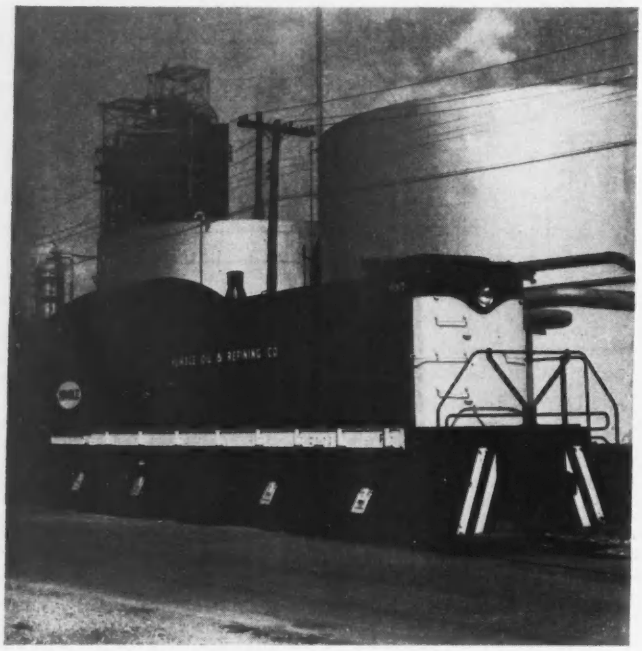
Even the early Diesel-powered trains featured comforts that thrilled the traveling public. People commented on berths with individual washbasins and adjustable night reading lamps, on the roller bearings and rubber cushioning that gave such a smooth ride at high speeds. Later, the *vista dome* gave travelers an upstairs "grandstand seat" where they could enjoy the passing scenery. Streamlined beauty attracted travelers to Diesel trains; speed and comfort made them contented customers.

Even with a staggering accumulation of proof before them, some skeptics still questioned the Diesel locomotive. Granted, it had speed. Granted, it looked good on the rails. Granted, too, it was economical on passenger runs. But the thing was a racehorse, not a workhorse; it couldn't "lean into the traces and pull," they said. Another test Diesel, Electro-Motive's *103,* knocked that argument into a cocked hat. Franklin M. Reck told the dramatic story in his book, "On Time."

The *103* (Reck's story goes) had just coasted into a small town when the conductor on the rear end noticed an axle was running dry in its bearing and throwing up smoke. He signaled frantically, but no one up front noticed his signals. Instead of coming to a stop, the train began to pick up speed. The conductor applied the air brake from the rear end, but the locomotive continued to strain forward. Up between the locomotive and its cars was a dynamometer car with an instrument registering pounds of pull. In Reck's words, "The automatic pen swung upward, registering 270,000 pounds of drawbar pull, which was the limit the



Diesel-powered trains thrill the traveling public with their speed, comfort, and good looks. Vista dome (fourth car, rear) affords a good view of the passing scenery.



Baytown Refinery, as if to cooperate with the Diesel article in this issue, has recently bought a Diesel switch engine. The new switcher, sporting bright new colors, has attracted much attention around the plant. No longer will it be necessary to "get up steam" to move railroad cars full of oil and chemicals around the refinery; the Diesel can be started and stopped with all the ease and speed of an automobile. As a bit of advertising showmanship, the Diesel is numbered **997**, for Humble's motor oil.

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device could record. The pen kept right on going, entirely off the sheet of paper."

At this point, the train began to stall. If the locomotive had been steam, the stall would have occurred sooner and nothing would have happened. But the Diesel kept on hauling. Reck continues: "All at once . . . the drawbar broke, and the locomotive leaped ahead. The apparatus on the work table, strained beyond its limits, shattered into pieces . . ." There was dramatic evidence enough of the Diesel's pulling power. It further proved its value as a workhorse in the switching yards, where it soon established itself as a "yard goat" with plenty of kick.

In the middle thirties, Diesel trains proved their worth in fairly rapid succession. There was the *Flying Yankee,* put in service early in April, 1935, by the Boston and Maine, which began setting records between Boston, Portland, and Bangor. Later in the same month, the Burlington put its *Twin Zephyrs* on the tracks between Chicago and the Twin Cities (Minneapolis and St. Paul). A six-hour schedule for this run cut five hours off the earlier steam schedules.

In June, 1935, Union Pacific began running its streamliner, *City of Portland,* from Chicago to the Coast. The trip took 39 hours, 45 minutes. By the middle of 1936, the *Santa Fe Super Chief* was on the job, as were the *City of Los Angeles* and *City of San Francisco.* The Illinois Central put a streamliner, the *Green Diamond,* to work between Chicago and St. Louis on a 4-hour, 55-minute schedule. The Rock Island was ordering Diesel equipment for its coming line of Rockets. The *Pioneer Zephyr,* now operating between Lincoln, Omaha, and Kansas City, had replaced two steam trains, was running 500 miles a day at low per-mile costs, and was crowding passengers aboard in droves. While rival lines went hammer and tongs at competitive Dieselization, the traveling public gobbled up the benefits of this faster, more comfortable rail transportation.

It was soon evident that the Diesels were doing what railroad management wanted them to do. Low fares and high speeds, with streamlined beauty thrown in for good measure, enticed people to travel for the fun of it, not just on business trips.

All the while, the oil industry was keeping step, working with railroad people and meeting ever-stricter specifications for products. The quality of fuels, lubricants, and greases mounted higher under refining research. Different additives were experimented with; different qualities used in test runs to decide what would result in the best products. Oil companies went so far as to buy Diesel locomotives of their own, for use in experimental and development work under actual operating conditions.

Although a Diesel locomotive ordinarily costs more than a steam locomotive of equal power, it is more efficient and cheaper to operate and maintain. As an example of comparative fuel costs, one authority declared that it takes an average of about four teaspoonfuls of oil to move a ton one mile when steam is the motive power. By contrast, a Diesel can do the same amount of work *on a teaspoonful of oil.* Thus, one barrel of Diesel oil does the work of four barrels of fuel oil in the old steam locomotives.

Further proof comes from the Interstate Commerce Commission itself. According to one locomotive manufacturer, a Commission report in 1947 showed that the railroads could have saved $340,000,000 *in fuel costs alone* if they had all been completely Dieselized that year. Another $210,000,000 could have been saved on the locomotive repair bills. American railroads spent an estimated half-billion dollars repairing steam locomotives in 1947. Small wonder there has been such a rapid and general swing to Diesels!

Mr. Robert M. Coultas of General Electric told the American Society of Mechanical Engineers that continued Dieselization of American railroads had been the most significant trend in motive power development during 1950. He said that between January 1, and September 1, 1950, domestic railroads had ordered 2,433 Diesel-electric units and that no new orders for steam locomotives had been placed with domestic builders for use in the United States during the year. This shows how far the revolution on rails has gone.

With the swing to Diesel has come a vast increase in the consumption of Diesel fuel manufactured by American refiners. Currently, the nation's railroads are consuming about 95,000 barrels a day, 37 per cent of total production. This compares with a mere trickle used 10 years ago.

Diesels, with their record for being economical, efficient, and "on time," have caught the fancy of railroad management and the traveling public. Powered by high quality Diesel fuel instead of steam generated from fuel oil and coal, a new, high-speed Pegasus has taken over the rails. It seems to be only a matter of time before the last old-style steam Iron Horse is retired. The U. S. oil industry has joined with the railroads of America to make rail transportation faster, smoother, more comfortable, and more economical than ever before.

COURTIERS *and* COLONIZERS

Leaders of the immigrants who founded New Braunfels and Fredericksburg were German noblemen. In the course of becoming Texans, they found buckskin more practical than velvet and plumes, the Bowie knife more useful than the courtly rapier.

THE SPIRIT and character that distinguish today's Texan were distilled over many years from a great many different kinds of people. Not all pioneers were unschooled, leather-clad woodsmen. Freedom, and the chance for a new life in a new world, brought aristocrat and frontiersman alike to Texas. Those who adjusted most painfully to the new life were the princes and courtiers who came straight from the pomp and ceremony of Old World drawing rooms.

Such a group formed the membership of the *Adelsverein*, an organization of German noblemen who encouraged immigration of their countrymen to Texas. Commissioner general of the society in 1844 was Prince Carl zu Solms-Braunfels.

Prince Carl himself met a party of Germans who landed at Galveston in the fall of 1844. From Galveston, they were carried by small craft to Indianport (later Indianola), christened Carlshafen by the Prince. There the party, cold and cheerless, spent a bleak first Christmas in Texas.

As a home for the newcomers, a large land grant (the Fisher-Miller grant) had been bought about 300 miles inland between the Colorado and San Saba Rivers. Early in 1845 the first caravan of immigrants pushed inland, but soon became discouraged when they realized the great distance to the land grant. They stopped at Victoria and McCoy's Creek while Prince Carl rode to San Antonio in search of a nearer place to settle.

HOUSE ON SEGUIN ST.
NEW BRAUNFELS

At San Antonio, the Prince was told of an area around the Comal Springs where water was plentiful and land was fertile. He visited the place, was pleased with its beauty, and bought a two-league tract from its Spanish owners for less than a dollar an acre. Moving forward from the vicinity of Victoria, the colonists arrived at Comal Springs in March, 1845. They named their settlement New Braunfels, in honor of Prince Carl's ancestral home.

During the months that followed, thousands of Germans landed at Carlshafen, only to hear the discouraging news that there was no way to move them inland. War had broken out with Mexico, and teamsters could secure higher paying contracts for military work. Housing was poor on the coast, and there was little to eat. Some tried to make the perilous journey inland on foot. Exposure and hunger brought on an epidemic, and a chronicler of the time reported, "The trail from the coast town to the colony was lined with German graves."

Meanwhile, New Braunfels, beset with disease and financial difficulties, hung on for existence. Prince Carl returned to Germany in 1845 and was succeeded by Baron von Meusebach, who later became known simply as John O. Meusebach.

Meusebach, a man of great energy and ability, put the colony on its feet. His first big job was to make room for the immigrants who continued to arrive from Germany in a heavy stream. In December, 1845, he dispatched from New Braunfels a surveying party of 36 men to establish a wagon road 75 miles farther inland to the Pedernales River, where he had bought land for a new settlement.

In May, 1846, the first group of weary colonists from New Braunfels arrived at the new place, a pleasant valley in the Texas hill country. They named it Fredericksburg, in honor of Frederick the Great of Prussia, himself a member of the *Adelsverein*.

Fredericksburg had its troubles. Cholera or some similar scourge took scores of its people, and it was only through the superb diplomacy of its leaders that the town was saved from destruction by the Indians. As it was, no one was safe on the streets at night, and many a settler in his front yard became a target for Indian arrows. Meusebach, an able diplomat as well as a great leader and businessman, went boldly into the

TEXAS SKETCHES by E. M. Schiwetz

In selecting subjects for his Texas sketches this time, E. M. Schiwetz had some difficult choices to make. There was a great wealth of fine old German architecture in the area, but only a limited space in which to present it. One question, however, was never in doubt: As a front cover for this issue, the *Vereins Kirche* at Fredericksburg, a restoration of the town's first church and meeting place and now a museum, was a hands-down choice.

In New Braunfels, Schiwetz was especially fond of the "House on Seguin Street" (preceding page). The Tatsch House at Fredericksburg, above, caught his fancy for its antiquity and its great Dutch chimney. Above, right, he has sketched a picturesque "Sunday House." For its texture and beauty, he chose the Rice House at Comfort (right).

On page 16, Schiwetz has featured two of Fredericksburg's lovely churches. One, in early German Gothic style topped with its ancient Nurnberg spire, contrasts beautifully with a newer church nearby.

The storefronts on Fredericksburg's mile-long Main Street were chosen for the soft texture of their stone and the delicate tracery of their ironwork.

camp of the Comanches and negotiated a treaty in 1847. The Indians, through their chiefs Buffalo Hump, Old Owl, and Santanna, had a high regard for the rocklike qualities of Meusebach. They called him "El Sol Colorado" (The Red Sun), for his flowing red beard. To their credit, the Comanches as a tribe honored the treaty, but bands of hot-headed braves continued to steal horses, burn homes, and scalp travelers. One historian summed up Fredericksburg's long struggle for existence with a salute to the pioneers:

> "The courage and perseverance of these early German pioneers is worthy of the highest praise. Here they were thousands of miles from their native country, not only in a foreign land, but in the solitude of a wilderness, with dangers of all kinds lurking around them, but unflinchingly did they bear all the numerous inconveniences and hardships incident to pioneer life. Their unreserved love of freedom was the bright star shining above them through all the dark hours and troubles of the first years of frontier life, and assisted these intrepid men and women to battle against and finally conquer seemingly insurmountable obstacles."

Fredericksburg Today

One of the most colorful of Fredericksburg landmarks today is a reconstruction in native stone of the original *Vereins Kirche* (front cover)—a combination church, fort, school, and meeting place of the pioneers. Built in 1846, the eight-sided structure was affectionally called the *Kaffeemuehle,* because it resembled an old-fashioned coffee mill. The building today is used as a library and museum, and contains an interesting collection of tools, weapons, clothes, cooking utensils, and household goods used by the pioneers. It also houses a collection of personal effects of one of Fredericksburg's "favorite sons" of the present, Fleet Admiral Chester W. Nimitz.

An inscription on the cornerstone of the *Vereins Kirche* speaks eloquently and accurately of the hardships suffered in early days:

> "Theirs was the trouble life,
> The conflict and the pain;
> The grief, the bitterness of strife,
> The honor without stain."

Fredericksburgers built their homes like they built their churches—to last. Stone and cedar were plentiful in the surrounding hills, and builders followed faithfully the architecture of homes they had left behind them on the Rhine. Scores of these houses, many of them more than a hundred years old, remain to give the town a quaint Old-World atmosphere.

Visitors are always interested in the town's old "Sunday Houses." These were built in the old days by farmers who lived in the country, to be used on week-ends when the family came to worship. After services, the house would be closed and shuttered until the family returned the following Saturday. Modern roads and the automobile have made "Sunday Houses" unnecessary today, but many of them still stand to give shelter to Fredericksburg families.

Just as the people preserved German architecture, they clung to traditional folkways and social customs. The *Ball der Verheiraten,* a dance for married couples, remains popular. The *Kindermaskenball,* originally a masked ball for children, is now attended by everyone at Fredericksburg, although at nearby Stonewall the children still maintain exclusive rights to this celebration.

There are the *Schuetzenbund,* a shooting club; the *Skat-tournier,* a tournament of the people's favorite card game of *Skat;* and the annual *Saengerfest,* featuring folk songs and traditional dances.

Every year, on Easter Eve, Fredericksburg kindles its "Easter Fires" on the surrounding hills. Wide-eyed children call them "rabbit fires," where bunnies blend the dyes and cook the eggs that are found in youngsters' Easter nests the next morning.

To many Fredericksburgers, the most beautiful and appealing sound in the world is the *Abendglocken,* or evening bells, which ring at 6 o'clock in the evening as a signal for everyone to stop working.

The character of the people has been as carefully preserved as their customs and traditions. The same qualities and virtues that made the German pioneers good colonists have made their children and grandchildren good Texans.

THE ELECTRIC LOG:

Picture of History

Wavy lines traced by beams of light make one of the most important tools for finding oil

Ever wonder just exactly how they know when they strike oil? Usually it's a rather quiet affair—no wild excitement, no big spectacle, just part of the regular job. In fact, on today's rotary rigs, crews are rarely aware of drilling through an oil formation. Yet, when you know what is going on, there's real drama, for it is *the* big moment.

In case you've never been around a rig when the hole is "down"—when the scheduled depth has been reached—come along to Rig 22 through the predawn fog with the production geologist as he weighs all the evidence and makes the key decisions about a well. Already the drilling crew has pulled the drill pipe out of the hole, and is helping the service company men rig up to run an electric log, one of the most valuable tools in finding oil.

The electric log is a "picture"—if you could call the wanderings of four wavy lines on a long strip of film a picture—of the formations which the well bore has penetrated. A mile and a half of hole make about six feet of picture. Using the electric log, the geologist can tell with remarkable accuracy the type of formations at various depths and their likelihood of containing oil.

As the service crew lowers the special electrode or *sonde* into the well on its special cable, the production geologist reviews all of his information about the well. Every scrap of geologic information available helps to analyze and interpret the log of the well. On this well, the T. V. Overton 2, a deep test in the Dickinson field of Galveston County, Texas, the geologist had a general knowledge of the geology of the area and the structure the well was to test from other wells drilled in the field. But the Overton 2 is being drilled deeper than the producing wells in the field, and the geologist can't afford to have any preconceived notions about what he will find.

In the case of a wildcat, the geologist would have seismograph information and data on other wells in the area as part of his background history of the well. Also, the paleontology of the formations penetrated by the well would be checked. The geologist would have stopped by the rig every few days to pick up the samples of the formation cuttings gathered by the drilling crew as each 30 feet of hole was drilled. He would then have checked the samples for the tiny fossils so helpful in identifying certain key formations, or have obtained a "paleo" report from the laboratory. On wildcats, additional information is often gathered by a mud logger—a device which extracts air from the drilling mud as it returns from the bottom and tests it for gas. When gas shows up, a keen lookout is kept for the tell-tale fluorescence of oil under a mercury lamp.

When the bit begins to approach possible oil and gas zones, the geologist usually asks the drillers to core the formations, to obtain the small cylinders or cores of the formations. From these samples, the geologist may be able to tell right on the derrick floor whether the prospects are good or bad. Often, a field laboratory is called upon to give a thorough analysis of the cores on the location. The cost of coring, because of reduced drilling speed and time to extract the cores, is almost double the normal cost of drilling. Recovery is not absolutely certain, so on most wells only certain sections are cored.

The general geologic characteristics of the area, supplemented by the "paleo" and mud logger reports, the cores and drilling log, are part of the geologist's

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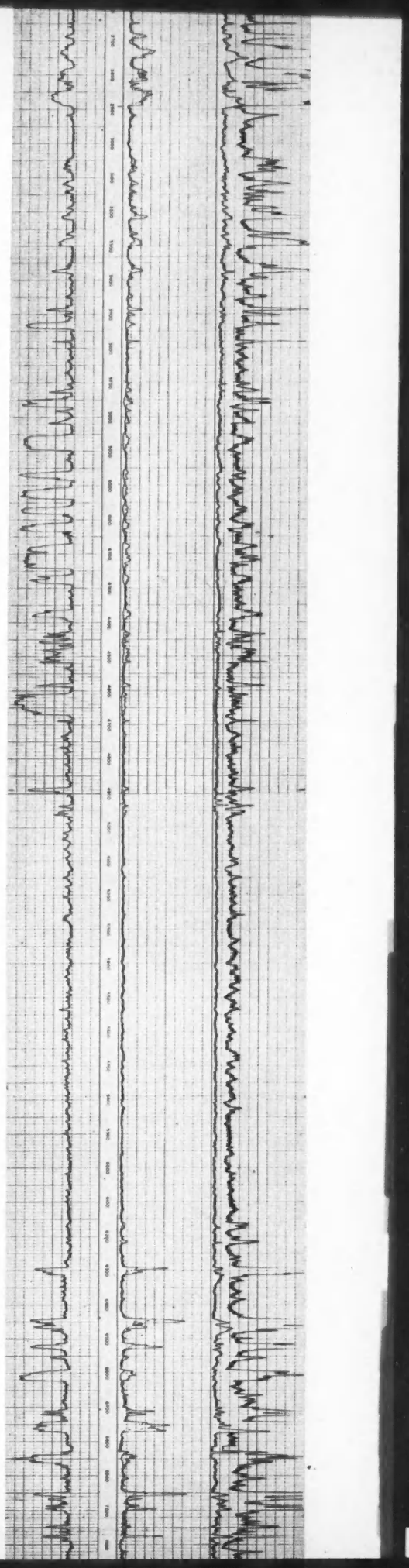
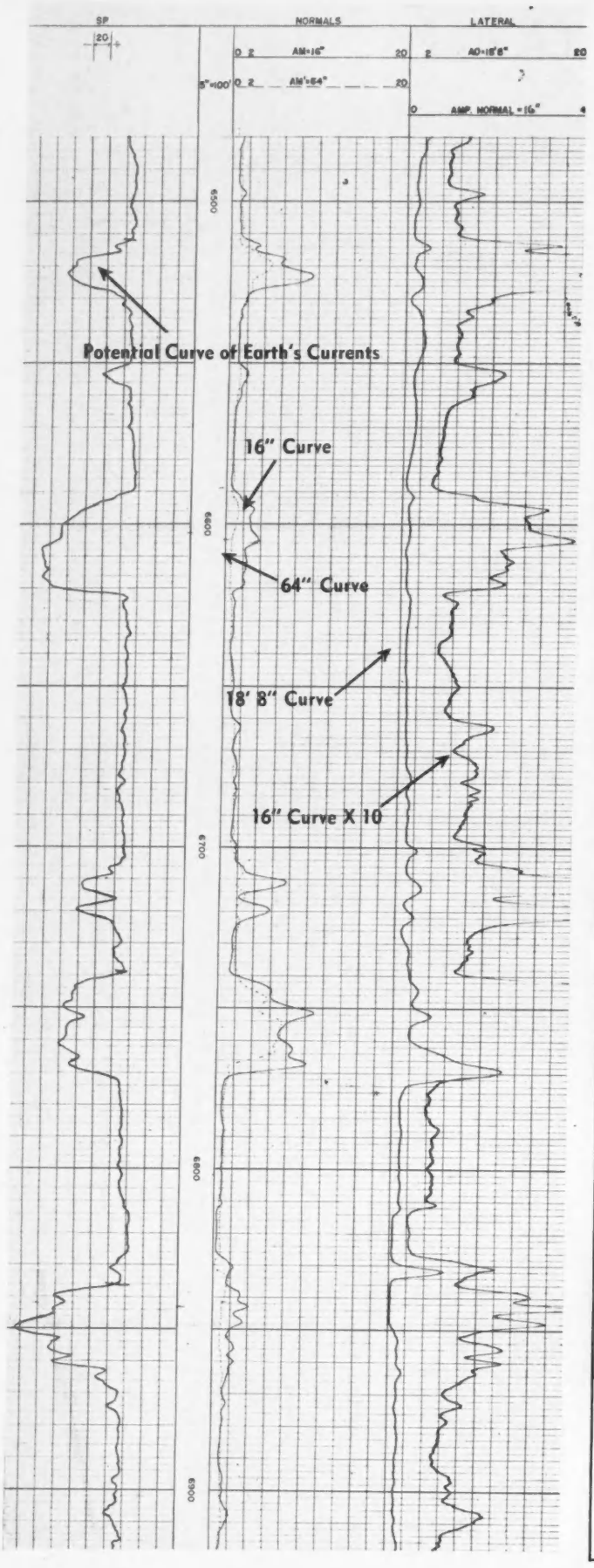
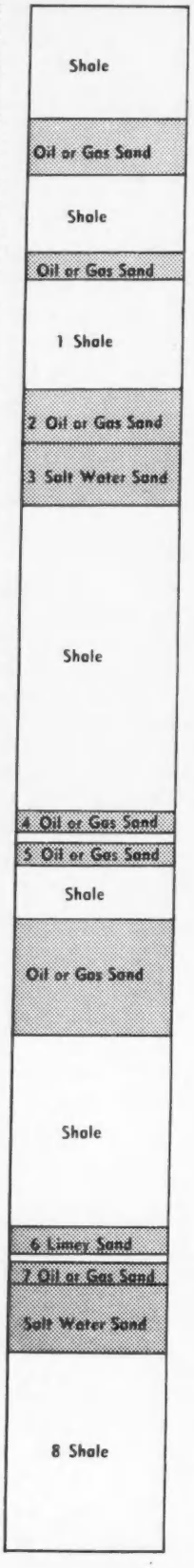


Reading an Electric Log

A log taken in the Gulf Coast area shows predominantly the sand and shale beds of the region. The sample shown here is typical of many Gulf Coast logs. On this page is an amplified portion of the complete log on the preceding page.





Indications of oil and gas are generally so much alike that distinction isn't possible from the log. In the log illustrated here, cores show all of the sands marked *oil or gas* to contain only gas.

Limestones are extremely difficult to interpret correctly. The curves are so complex and there are so many variables in interpretation that an example of such a log is omitted here. It requires a geologist or engineer familiar with the area to identify a limestone and to find an oil zone from the log. The log is still extremely valuable, however.

Numbered formations on the chart at left are interpreted below:

1. Positive potential (left hand curve moves to right) plus low resistivity (right hand curves all are at the left) indicates shale.
2. Negative potential (left hand curve moves out to the left) indicates sand. Resistivity higher than underlying salt water sand (note dotted curve) indicates oil or gas. Cores and production from this well prove all accumulations to be gas.
3. Greater negative potential and very low resistivity (note dotted curve) indicate salt water sand.
4. and 5. Negative potential plus higher resistivity on 16" and 18' 8" curves indicate oil or gas sand. Lack of resistance on 64" curve is due to sand being about the same thickness as the electrode spacing.
6. Low negative potential, inverted "kick" on 64" normal, and high resistivity on 18' 8" lateral curves indicates thin resistant bed, probably limey sand.
7. Reduced negative potential with inconclusive resistivity readings suggests possible oil and gas sand. 18' 8" lateral curve is "blanked out" by highly resistant bed 6 above. Cores show this to be gas sand.
8. Shale with sandy streaks at 6,864-68 and 6,873-75 feet.

The 16- and 64-inch normal curves give indications of the formations inside spheres of those respective diameters. The 18-foot 8-inch lateral curve surveys the formations in a space roughly similar to the peel of an orange of that diameter. The far right-hand curve amplifies the 16-inch curve times 10.

The normal and lateral curves are measurements of artificially-supplied electric currents; the potential curve on the left is a measurement of the currents within the earth itself.

Humble production geologist Dacey (right) and log operator McRae look over freshly-developed film of log on Humble's T. V. Overton 2 well in Dickinson field. Geologist is on the spot when log is completed, to interpret the log and make decisions.

mental picture of the well as he awaits the electric log. Although there was no special paleo work or mud logging done for T. V. Overton 2, cores were taken from 8,735 to 8,872 feet. Core analysis showed an oil sand from 8,754 to 8,805 and salt water sand from 8,805 to 8,830. This is the regular producing sand for the field; the new log coming out of the hole started up from 9,399 feet.

Three days earlier, a "kick" in the mud betrayed the penetration of a new high pressure zone. A mud engineer has been on the job since then, and starting the log was delayed more than 12 hours as tests were made and the drill pipe carefully pulled out of the hole. The big question in the gray foggy dawn is, what caused the kick—oil and gas or salt water? And where is it?

When the sonde reaches the bottom of the hole, it is pulled out at a slow uniform rate. In the T. V. Overton 2, the trip takes about two and one-half hours. As it rises, electrodes in the sonde pass a current into the formations, and the resistance to the flow of current is measured by galvanometers in the recording truck at the surface. Beams of light from the galvanometers trace a record on photographic film, which is developed in the truck.

The long sheet of transparent film traversed with wavy black lines is a history of the earth at that point. The geologist's job is to find the zones where oil or gas may occur. It is possible to find thin productive sands only one or two feet thick.

The electric log reflects the presence of water carrying dissolved salts and the natural currents of the earth itself. Since almost all of the earth was under water at one time or another, the entrapped sea water in formations deposited hundreds of millions of years ago gives a clue to the nature of those formations. The engineer or geologist who interprets the log most of the time can locate permeable zones and often tell whether they contain fresh or salt water, or oil and gas.

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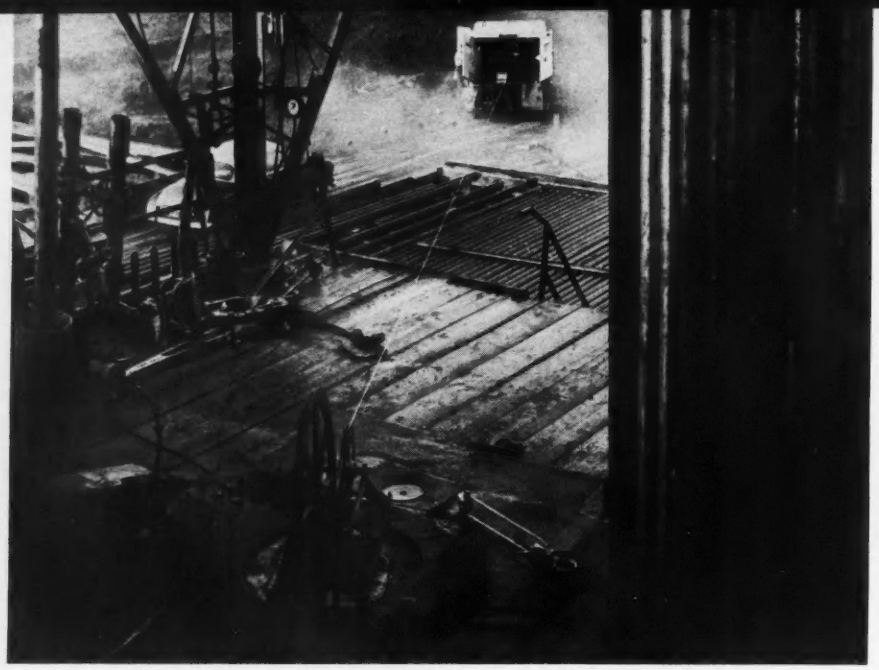
Logging truck stands before Rig 22's derrick full of drill pipe as electric log is run.



From winch in back of logging truck to sheaves mounted on the rotary and down into hole goes the special cable for the logging electrode or *sonde*. Fog shrouds truck.

Running an Electric Log

Resistivity of drilling mud is checked in special cup before the log is run. This measurement is important.

Operator inside logging truck observes recording of the log on film. When log is complete, film is developed for on-the-spot interpretation.

Service crewmen wash the rubber-sheathed electrode or *sonde* over hole.

Service crewmen replace *sonde* in truck. Behind nearest man is new contact logger which rubs side of hole for more exact indications of changes in formations being logged.

On the film, the irregular line on the left is the record of electric currents generated in the earth itself. It is used for correlation between logs, and as a guide in differentiating between sand and shale.

The actual cause of these earth currents is not definitely established, although the source is known to be where fresh water from the drilling mud contacts shale containing salt water.

On the right-hand side of the film are curves which indicate the resistance to flow of an electric current through a formation. If the formation is saturated with salt water, the current flows easily; hence the resistance is low. If oil and gas have displaced most of the salt water in the zone, there is a higher resistance to flow. The curves record penetration from five inches to nine feet into the formation. The shorter curves give indications of the points of contact between formations, and the longer curve gives a truer picture of the formation fluids beyond the zone next to the well which is invaded by fresh water from the drilling mud.

On the basis of this simple description, it might be concluded that interpretation of the log is easy. Actually, it requires long study and practice to become acquainted with the characteristics of the various formations and to account for the many variables in the earth beneath us. Each formation has its own personality. While it may be the same in an adjacent well, it may be entirely different in another well just a few miles away. The salinity of the drilling mud, thickness of the formations, diameter of the hole, density of the drilling mud, temperature at the bottom, and a host of other things complicate the log's interpretation.

The background of logging experience in a region contributes materially to the interpretation of logs there. For example, logs are interpreted fairly easily in the Gulf Coast area, where thousands of wells have been drilled and logged; in a new area, geologists have much more difficulty in interpretation, since their experience in identifying those formations is limited. Still, the electric log is one of the most important oil-finding tools, for it can be interpreted accurately enough to give an indication of possible oil or gas zones.

For further checking where a core was not recovered, or where there is a question of the interpretation of the electric log, the geologist may ask for sidewall samples of the hole at certain depths. This is the last step the geologist takes in estimating a well's possibilities. There remains only the drill stem test to see exactly whether the well will produce or not.

Today, most of the wells drilled are electrically logged. The value of the tool is in the many ways it is used:

For the production geologist on the well, of course, the log indicates zones which probably will contain oil or gas, the thicknesses of these zones, and the level of contact between oil and salt water. If junk or tools are lost in the hole, the electric log may help in finding them. The log may be used to select a good formation for seating the well casing.

For the subsurface geologists who study well logs and correlate zones in the same region, the logs provide a means of tying key formations in one area with those of the same age in another. Many new fields have been discovered by such correlation study. The logs provide the most accurate picture of the sequence of formations used for correlation.

For the reservoir geologists and engineers the electric logs provide a picture of the nature and extent of a reservoir. The logs are used as an aid for determining the area and volume of an oil reservoir. These help the engineers in developing the fundamental information about the reservoir, upon which the method of completing the wells and producing practices are based.

A French mining engineer named Conrad Schlumberger discovered the principle of electric logging in an extension of some electrical prospecting techniques which he had developed. From early experiments M. Schlumberger developed a relationship between the readings on his galvanometers and the nature of the formations under the ground and applied it to oil well bores. The first oil well was surveyed in Venezuela in March, 1929; two months later the first well in the United States was surveyed. Today all electric logging is done by the processes developed by either the Schlumberger Well Surveying Corp. or the Halliburton Oil Well Cementing Corp. The latter has a similar process, though with different measuring techniques.

WHAT about wells drilled before Schlumberger made his discovery and refined the method of making well logs? For the most part, drillers' logs, cutting samples, and cores make up their histories. In recent years methods have been developed to survey wells in which casing has been placed. Many old wells have been checked by gamma ray logs, which measure the gamma rays given off by the formations. The neutron log uses reflected rays from a radium salt to measure the hydrogen ion in the formation. Distinction can be made between shale and sand, and a gas sand can be identified, though no distinction can be made between oil and salt water in sand. Both of these radioactive logs are relatively new, and interpretation is not as advanced as with the electric logs. The gamma ray and neutron logs can "see" behind the well casing, however, and the electric log can be run only in open hole.

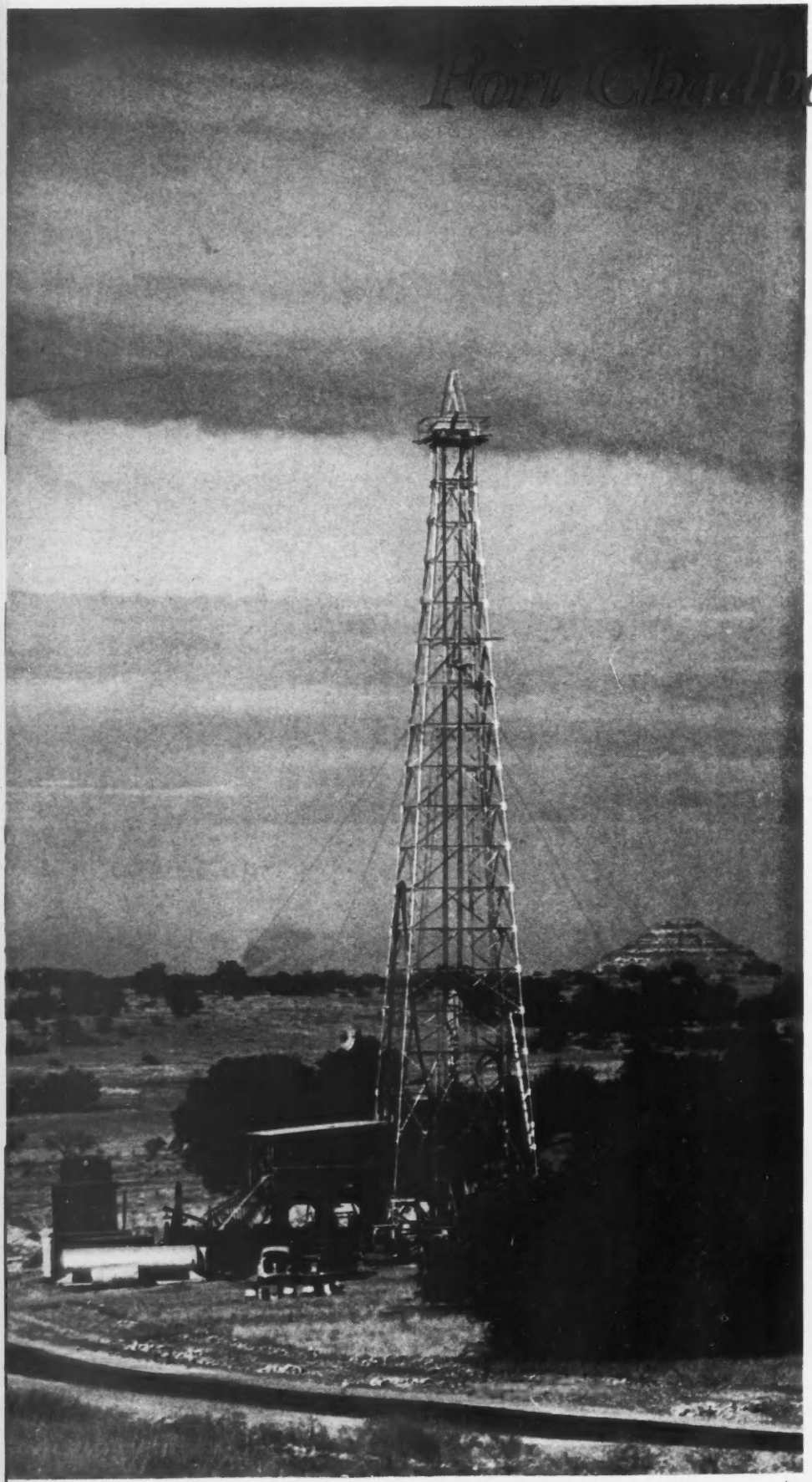
All of these methods of seeing beneath thousands of feet of rock are characteristic of the effort to improve the ways of finding oil. Vast sums of money have been spent in the scientific approach and application of new ways of searching for oil and producing it. The search is spurred by the fiercely competitive oil industry in its quest for new oil discoveries.

Although great progress has been made, much work remains to be done, as existing methods of logging fall far short of providing all that must be known for maximum exploitation of oil prospects.

Humble research men have been very active, and are today engaged in an extensive program of study into all phases of well logging. In seeking a greater usefulness and understanding of well logging, they are working toward development of new methods and equipment and better interpretation of logs. Success in any of these phases will make the search for oil and improvement of production practices easier, and contribute to the ceaseless effort of providing ample supplies of oil and gas.

The T. V. Overton 2? The log showed sands around 9,202, 9,295, and 9,370. While they appear to contain salt water on the basis of the log, there is some doubt. The geologists asks for sidewall core samples at 9,204, 9,208, 9,211, 9,296, 9,301, and 9,372 to check every possibility.

P. S. The cores all contained salt water. T. V. Overton 2 will be drilled deeper.



Fort Chadbourne Field

Important West Texas reservoir being developed systematically in shadow of old frontier fort

Fort Chadbourne was established in eastern Coke County in 1852 as one of a string of U. S. Army posts in north and west Texas to protect settlers against Indian raids. Like many other Texas posts, it was also a way station on the Butterfield Stage which made scheduled semi-weekly trips delivering mail over the 2,795-mile route between St. Louis and San Francisco.

Today, the crumbling ruins of Fort Chadbourne look down upon a busy new oil field which bears its name. Where the stage coaches wound their way through draws and over mesas almost a century ago, a planned pattern of roads now leads to active drilling rigs, or to producing wells and gleaming tank batteries. The mesquite covered valleys and oak studded hillsides which had known few sounds but the click of cattle and horse hooves now echo with the whir of engines, the clanging of steel on steel, the steady drone of drilling machinery.

These strange new sounds first began in April of 1949, when Humble staked the location for Sallie Odom No. 1 in northwest Runnels County. Drilling was started on May 1, and for 51 days the drillers and crewmen sent the bits biting into the earth—fast at times, cautiously at other times. This was a rank wildcat nine miles from the nearest producing oil well. This wildcat was projected to the Strawn Lime, with the hoped-for pay zone expected at about 5,500 feet. By the time the bit reached 5,480 feet a promising 44-foot lime section had been penetrated.

Test preparations were made and the formation was shot at the 5435-5454 foot level. Production on the initial test was 320 barrels daily of 45 gravity oil. Thus a new oil field was born.

Since Humble's discovery well, more than 90 wells have been drilled by

Mesas and round hills form a backdrop for one of Humble's active rigs in field.

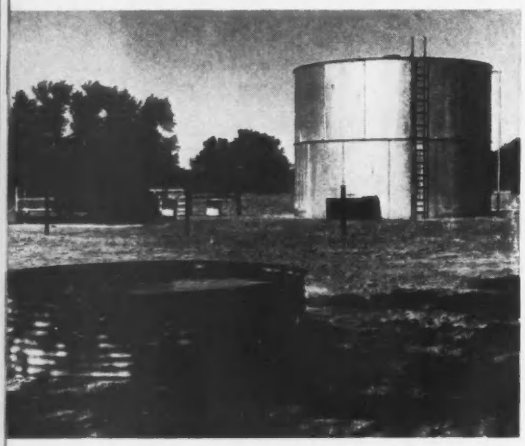
Mesquite-covered valley of Wagontire Flat is scene of most Fort Chadbourne field activity. Two of field's seven rigs are drilling here.

Wagontire Flat is the expressive name ranchers of Runnels and Coke Counties long ago gave to the almost circular valley in which nearly all of the Fort Chadbourne producing and drilling activity is concentrated. From the air the area looks like a giant wagon wheel. The valley varies in width from about one to four miles. Sticking up in the center, like the hub of a giant wagon wheel, is the round, elevated plateau on which Humble's field community is located.

Sallie Odom No. 1, the discovery well, required 51 days to drill. The "jackknife" rig in background now requires only about 25 days to drill a field well.

Construction crews cut roads to new locations; build them into field pattern for long years of use.

New employee community on high hub of Wagontire Flat has daily mail and school bus service. Surplus water, below, is pumped into open tanks for cattle.



Production tanks are located on hillsides so oil flows by gravity to pump station.

Pump below moves field's oil through new 8-inch line to main line at Ballinger.

Humble and other operators in the area. Of these there are 78 producers in the Fort Chadbourne field proper, and according to testimony at field rules hearings before the Railroad Commission of Texas some 10,000 acres are considered potentially productive.

Most of the production in the field to date is in an area which the ranchers call Wagontire Flat—a wide, almost circular valley surrounded by mesas and hills. In the center is a high circular mass of land which forms what may be termed the hub of the wagon wheel.

On this plateau, about 140 feet above the valley, Humble has built a field community for employees. Also on this point are the water storage tanks which supply the community and all drilling operations.

From the very beginning one of the major problems in the field was lack of water for drilling. Wells were almost non-existent, and the surface water in tanks was too precious to the ranchers to be used for drilling. Water contractors hauled it from distant sources to well locations for an average of about $1,500 per well.

In an effort to develop an adequate water supply for drilling and other purposes, the district personnel made a study of the area, including existing wells used for stock water. This study brought very little encouragement. However, a number of water wells were drilled; some of them were producers. The producing water wells got their supply from crevices, but the water was not good for domestic use and the supply was very limited. Humble geologists were called in to study the area for promising water sands.

The promising areas were drilled with a contract water well rig. Some of these wells were successful, others were not. But today the supply of water is adequate for both domestic use in the field community and for drilling and field operating purposes. Wells are five to six miles from the field community in opposite directions, but a field water system delivers the water to a central set of storage tanks on the plateau near the community. From this point the water flows by gravity to the community and various parts of the field. The water wells produce from a depth of 200 feet.

At several of the well sites along Oak Creek, which meanders through the Humble-held acreage and is dry except after infrequent heavy rains, surplus water is diverted into open steel tanks for cattle.

Before many of the present water wells had been drilled and when only two producing oil wells had been completed, Humble reassigned the Fort Chadbourne field from its West Texas to its North Texas Division. Effective December 1, 1949, the Winters District was created with headquarters in nearby Winters. Operations and development in the Fort Chadbourne, Bronte, Taylor County, and Winters Strawn fields were thus consolidated. Four drilling rigs were then in operation, and Humble had 16 producing wells.

Expansion in these fields has been steady. On December 1, this year, the district has seven active rigs and 78 producing oil wells. Thirty-six of the wells are in the Fort Chadbourne Field and three in the nearby West Fort Chadbourne field.

Comparatively fast development of the substantial Fort Chadbourne reservoir required an outlet for the crude oil. During the summer Humble Pipe Line Company laid a field gathering system and an eight-inch line to its Ballinger Pump Station. A pump in Wagontire Flat receives oil by gravity flow from production tanks in the field and moves it 32 miles to the main line at Ballinger. Prior to the installation of the line, the crude oil was being moved by trucks to a refinery about 65 miles away. The volume had become so great —more than 43,000 barrels a month— that this method of moving the oil had become a real problem.

The employee community on the high hub of Wagontire Flat provides homes for the Farm Boss, Gang Pusher and Pumpers, and building sites for other employees. Daily mail delivery and a school bus right to the front door remove any feeling of isolation. And a good black-top road leads from the camp to U. S. Highway 277, the "Old Butterfield Trail," a few miles distant. Work in progress will add a meeting hall and recreational equipment to the community, and more homesites are being prepared.

And continuing development of the field to its expected ultimate size will continue to keep Wagontire Flat resounding to the clanking and bustle of a busy oil field.

FORT CHADBOURNE

—Then and Now

"There are few houses besides the government buildings, and few inhabitants besides the soldiers. The place is almost surrounded by a sort of barricade which was built a few years hence in anticipation of a sweeping attack by the Indians which did not come off." Thus Fort Chadbourne looked in 1858 to Walter L. Ormsby, New York newspaper man who made a trip on the Butterfield Overland Stage and wrote a series of articles about his trip.

Although established as a tent encampment in 1852, the fort soon had a series of stable stone buildings in the form of a quadrangle. Federal troops occupied the fort until 1861 and again from 1865 to 1867.

Today, only four of the Fort's permanent structures remain partly intact. Two of these are tied in with the corral system on the ranch where they are located; one serves as a granary and feed storage building.

Crumbling Fort walls stand silent guard over the quadrangle where Federal troops stood guard for settlers almost one hundred years ago.

Broken wagon wheels blend with slowly crumbling native stone and mortar walls of one of Fort Chadbourne's hardier structures.

THEY HAVE RETIRED

SINCE these columns last reported, 27 long-time employees of the Humble Companies have retired. Only one of these employees has less than 20 years' service.

Humble Pipe Line Company—Frank P. Daniell, engineer at Benavides Station, retired November 3 after more than 30 years' service. He started work with Humble in a ditching crew on the first main line from West Texas to Goose Creek. In 1939, he was assigned to Benavides Station and helped to put it in operation.

Edward J. Fay, engineer at Harbor Island, retired November 29 after 23 years' service. He began work with the Company as a pipeliner at Ingleside. Except for a short time as pipeliner and head stock gauger, he has served as engineer.

Charles Franklin, terminal gauger at Baytown, retired October 18 after more than 29 years' service. He was employed as laborer at Goose Creek; later he served in various capacities at Goose Creek, Baytown, and Tomball.

James E. Fuller, tank caulker at Webster, retired December 1 after more than 27 years' service. He was employed at Webster as tank caulker and later worked as a laborer, tank builder, boilermaker helper, riveter, pipeliner, and assistant tank foreman.

Theodore J. Gensler, engineer at the Bateman Station, retired November 27 after 30 years' service. He was employed as a laborer at Desdemona. Mr. Gensler makes toys for underprivileged children and helps with the local Girl Scout program. Other interests include woodwork and gardening.

Jesse P. Hancock, pipeliner at Comyn, retired November 16 after almost 26 years' service. All of his service has been at Comyn where he has worked in various capacities. He will live on his farm near De Leon, Texas.

Walter L. Howard, division superintendent of Southwest Texas, retired December 1 after more than 31 years' service. He started with the Company as chief engineer at Pendell Station. In April, 1926, he was made division superintendent at San Antonio, and in 1936 he moved with the division headquarters to Corpus Christi where he worked until his retirement.

George E. Johnston, district gauger at Longview, retired on December 21 after more than 25 years' service. He started to work as laborer at Iowa Park and Holliday. On August 8, 1950, Mr. Johnston completed 42 years in the gauging business; this time was spent with Gulf Pipe Line Company, the Lorraine Petroleum Company, and Humble Pipe Line Company.

William H. Kellam, pipeliner at Baytown, retired on November 1 after more than 24 years' service. He worked at Powell, Goose Creek, Hearne, Pierce Junction, Damon, Sugarland, Baytown, and Webster.

Charles Richeson, field engineer at London, retired November 25 after more than 22 years' service. He began work with Humble as a carpenter. All of his time with the Company was spent at Pampa and London. He plans to garden at his home near Overton.

Production Department—William C. Blackman, lease pumper-gauger at Gladewater, retired October 22 after more than 23 years' service. He was employed as a roustabout, but he spent most of his time with Humble as a pumper. He plans to raise pheasants, squabs, chickens, flowers, and a garden.

Jasper Grant, night watchman at Galveston Bay, retired November 30 after more than 30 years' service. He was employed as rotary derrickman at Goose Creek, and later worked as rotary helper, rotary fireman, roustabout, watchman, and pipe helper at Baytown Refinery. He intends to buy a small place and raise chickens, calves, and a garden.

Ardis C. Harper, roustabout gang pusher at Darrow, retired November 6 after more than 26 years' service. He started work with Humble at Haynesville, Louisiana as roustabout, and later was driller on the first Company diesel electric rig in Lake Washington. Mr. Harper has a 603-acre farm near Minden where he plans to raise Brahman cattle and teach his five boys to be farmers.

Charles C. McAlpin, toolpusher at Snyder, retired on November 15 after 22 years' service. He was employed at Caddo as a rotary helper. For about eight years he was driller. He will devote time now to being a stockfarmer at Pioneer, Louisiana.

John H. McClendon, lease pumper-gauger at Hardin, retired December 20 after 24 years' service. He was employed as roustabout at Pierce Junction and later worked at Goose Creek, Barber's Hill, South Liberty, Hull, Sour Lake, and Hardin.

Luther M. Richmond, compressor plant operator and gauger at Goose Creek, retired November 16 after more than 29 years' service. He went to work for Humble as a mechanic at Goose Creek. He later worked in various positions at Barber's Hill and Raccoon Bend. Recently Mr. Richmond completed a new home at Baytown, where he will live.

Phillip H. Walber, toolpusher at Kelsey, retired November 1 after more than 28 years' service. He started to work for Humble in 1917 as a driller after having been associated in the same capacity with R. L. Blaffer and W. S. Farish. The majority of Mr. Walber's service has been in drilling.

Alfred C. Waldrep, Sr., rotary driller at Tomball, retired December 4 after 32 years' service. Mr. Waldrep came to work for Humble in 1917 from the Fondren Drilling Company. He has worked as roustabout, derrickman, fireman, rotary helper, and rotary driller in many Texas and Louisiana oil fields. He plans to buy a place and raise chickens and a garden.

Houston Office—Howard C. Combs, hall attendants supervisor in the Comptrollers Department, retired November 20 after more than 21 years' service. He began with Humble as secretary to the comptroller and had the hall service as a part time assignment. Later it became his major responsibility.

John T. Glaviana, junior accountant in the Refining Accounting Office, retired November 21 after almost 21

☆ ☆ ☆ Employees Recently Called to Military Service ☆ ☆ ☆

ARMY

Ammons, Homer Lloyd	Baytown Refinery
Andrews, Robert Cecil	Baytown Refinery
Bailey, Don W., Jr.	Sherman Bulk Station, Sales
Brooks, Henry Clinton	Maurbro Production
Broome, Floyd Elijah	Mallalieu Production
Canon, John Dewey	Galveston Bay Production
Clement, Adam Watts	Baytown Refinery
Duncan, James Burnie	Baytown Refinery
Easley, Roy Huson	Exploration-Geophysics
Fade, Walter Wayne	West Texas Div. Field, Pipe Line
Findley, William O.	Friendswood Production
Garner, Phillip E.	Baytown Refinery
Gatewood, Charles	Kilgore Gas Plant
Honey, Dee Franklin	Baytown Refinery
Hubbard, James E.	Wink Production
Hudgins, Joe Lane	Exploration-Geologic
Hutchen, John T., Jr.	Sales Accounting, Houston
Joines, James Thomas	Thompsons Production
Lee, John Sidney	Baytown Refinery
Leonard, Joseph F., Jr.	Land, Records, & Rentals, Houston
Lewis, Roy Leon	Tom O'Connor Gas Plant
McDuffey, John C.	Gas Construction
McKay, Ben Berzzella	Exploration-Geologic
Miller, Dean Hudson	Exploration-Geophysics
Newton, Cecil J. V.	Baytown Refinery
Nieto, Rodolfo Campos	Baytown Refinery
Parish, Joseph D., Jr.	Baytown Refinery
Prasek, Daniel Joe	Production Accounting, Houston
Prigmore, Thomas Lee	Baytown Refinery
Quinton, Curtis L.	Baytown Refinery
Richmond, W. J.	West Texas Div. Office, Production
Riley, Edgar Lee	Baytown Refinery
Ross, George B.	Exploration-Geologic
Ross, John Francis	Hobbs Production
Sauer, Conrad L., Jr.	Warehouse Accounting, Pipe Line
Schulte, Henry Whittaker	Baytown Refinery
Slagle, Charlie G. E.	Baytown Refinery
Stewart, Robert D.	Katy Gas Cycling Plant
Teasley, James Edwin	American Gas Plant
Tidwell, Alvin Ray	Katy Gas Cycling Plant
Timmins, Harold	Baytown Refinery
Tinney, Verner Lavon	Odessa Connection, Pipe Line
Walker, Gordon Howard	Gladewater Production
Walker, J. W., Jr.	Baytown Refinery
West, John Thomas	Wink Production
Wheeler, Joe Dan	Stationery, Printing, Houston
Wilson, David Stewart	Exploration-Geophysics
Wood, Wendell W., Jr.	Exploration-Geophysics
Burda, Robert Lee	Exploration-Geologic Research
Martin, Clyde Watt	Baytown Refinery

AIR FORCE

Adam, Paul Alfred, Jr.	Stationery, Printing, Houston
Barnes, Berry L.	Production Accounting, Houston
Blakemore, James E.	Northeast Texas Div., Sales, Dallas
Brawner, Carl Noble	Baytown Refinery
Brown, Charles Henry	Friendswood Production
Carlton, Robert Clifton	Stratton Production
Cole, David Benjamin	McCamey Connection, Pipe Line
Couch, Rex Goodnight	Baytown Refinery
Cowart, Bailey V.	Comptrollers, Houston
Cramer, Robert L., Jr.	Baytown Refinery
Crump, James Thomas	Baytown Refinery
Ellis, James Carl	Clear Lake Gas Plant
Gandin, William B.	Production Accounting, Houston
Greb, Lee Edward, Jr.	Production Accounting, Houston
Grodhaus, Ray F.	Tomball Natural Gas System
Keith, Harold Loyd	Baytown Refinery
Kirkland, David E., Jr.	Specialty Products Mfg.,Sales, Houston
Lacombe, Melvin J.	Bayou Sale Production
Lucas, Jack	Exploration-Geophysics
McKim, Horace Walton	Houston Bulk Station Sales
Martin, Whitfield A.	Baytown Refinery
Mechler, Harvey F.	Friendswood Production
Moye, Clyde Raymond	Baytown Refinery
Pitts, John William	Treasury, Houston
Rackley, Lee Wilson	Baytown Refinery
Sanders, Haynes Vester	Katy Gas Cycling Plant
Sollars, Perry F.	Exploration-Geologic
Stepchinski, W. V.	Hall Attendants, Houston
Taylor, James Henry	Aviation Transportation, Houston
Teller, Kenneth W.	Production Accounting, Houston
Tucker, John Bee, Jr.	Baytown Refinery
Weeden, Kenneth Carl	Production Accounting, Houston

NAVY

Addicks, Earl Clinton	Crude Oil Dispatching, Pipe line, Houston
Bosier, Barney E., Jr.	Crude Oil Accounting, Houston
Dressendorfer, H. V.	Refining Accounting, Houston
DuBrul, Douglas Willard	Southwest Texas Div. Ofc., Pipe Line, Corpus Christi
Edwards, Norman E. B.	Stationery, Printing, Houston
Hartmann, Arlon A.	Production Accounting, Houston
Hartzog, Leahmon H.	Southeast Texas Div. Ofc., Sales, Houston
Hebert, Ellison	Beaumont Bulk Station, Sales
Hooper, Henry Lee	Stationery, Printing, Houston
Jolly, Walter Lee, Jr.	Baytown Refinery
Kennedy, John Higgins	Southwest Texas Div. Ofc., Production, Corpus Christi
McCormick, Jim Conley	Wink Production
O'Connor, Dana Eugene	Baytown Refinery
Porter, Robert Richard, Jr.	Baytown Refinery
Ricks, Theodore R.	Anahuac Gas Plant
Salter, Calvin Rye	Exploration-Geophysics
Scott, Charles W.	Grand Isle Production
Seamans, Lynn Andrew	Baytown Refinery
Strickling, Joseph J.	Baytown Refinery
Wright, Jack Ledford	Exploration-Geophysics

MARINES

Andress, Johnnie W.	Baytown Refinery
Avriett, Rupert Glenn	Exploration-Geophysics
Carl, Charles H., Jr.	Exploration-Geologic
Dunn, M. L.	Alice Bulk Station, Sales
Fulmer, Earl Clayton	Baytown Refinery
Hardy, Hugh Wilsie	Exploration-Geophysics
Krauel, Fred D.	Mail Room, Houston
Larson, Norman D.	Stationery, Printing, Houston
Miller, Lowery H., Jr.	Land, Records, & Rentals, Houston
Spearman, Donald Ray	Land, Records, & Rentals, Houston
Spence, James Hugh	Land, Records, & Rentals, Houston
Turner, Mack	Wink Production
Whiteside, Samuel F.	Exploration-Geophysics

years' service. He started with the Company as a clerk. Mr. Glaviana has been interested in civic affairs and sports for many years and in retirement plans to catch up on fishing and to attend more football and baseball games.

Hazel C. Green, file supervisor and librarian in the Employee Relations Department, retired October 9 after 16 years' service. All of Miss Green's service with the Company has been in the Employee Relations Office. She helped establish the efficient filing system now in use by the Administrative Section. Her special interest has been a small ranch near Wimberley where she is now living.

Consuelo L. Marmion, steno - title clerk in the Exploration Department, retired November 24 after 22 years' service.

Raymond E. Sinclair, chief accountant in the Production Accounting Office, retired December 1 after more than 32 years' service. He went to work for Humble in charge of the Accounting Office which included at the time, work of the Production, Refining, and Treasury Departments as

By the way . . .

(Continued from page 27)

well as that of the Pipe Line Company. His plans for the future include raising poultry on a small farm in Montgomery County.

Howard S. Warner, assistant manager of the Employee Relations Department, retired December 1 after more than 21 years' service. Mr. Warner joined the Humble Company as a rotary helper in West Texas early in 1929, and in the fall of that year he came into the Employee Relations Department. In 1937, he was made assistant manager of the department. His associates presented him with a shotgun to help him enjoy his favorite sport, hunting.

Mae C. Weatherford, junior accountant in the Production Accounting Office, retired December 6 after 31 years' service. All her service has been in the Production Accounting Office. She is the first woman retiring from the Company with more than 30 years of service. In retirement she plans to be a full-time housewife and travel with her husband on business trips.

HOUSTON ARTIST HARRIS GOODE went to a pump station before beginning work on the illustration for "Behind the Scenes at a Pipe Line Station" on pages 8 and 9. Operating chief engineer H. A. Rachuig in the hat explains the operation of the Warda pump station's valves and controls to the artist on his visit during construction of the station.

As he did with the pipe still in the last issue, Goode also studied the operation and appearance of the valves in photographs and catalogs before he went to work. For the sake of a pleasing illustration, he took the liberty of moving the electric transformers and the radio tower from in front of the storage tank, and he shortened the distance from the incoming line to the pump building. The piping and valve layouts and the station itself are faithfully depicted as they stand on a pine-covered hill between LaGrange and Giddings, Texas.

Deaths

Since the last issue of the HUMBLE WAY, nine active employees and six annuitants have died.

Active employees who have died are: Joseph Q. Dobbins, 53, assistant district chief clerk LD at Maurbro District, on October 17; Lloyd L. Ethington, 25, helper at Baytown Refinery, on November 4; Robert Gentry, 58, gas plant engineer first at Heyser, on October 12; Louis Joseph, 59, laborer at Baytown Refinery, on November 3; Earl G. Kersh, 25, reproduction operator in the Comptrollers Department Houston Office, on November 10; Charles W. Norwood, 54, janitor in the Houston Office, on November 10; Rudolph Strobel, 57, helper at Baytown Refinery, on October 7; Roger B. Shaw, 49, material yardman at Hawkins, on October 23; Herman R. Wiedenfeld, 27, senior clerk at Specialty Products Manufacturing Plant, on November 23.

Annuitants: James A. Clark, 73, oiler at Hearne Station Humble Pipe Line Company before his retirement, died on November 20; Grover C. Hamrick, 64, toolroom man at Baytown Refinery before his retirement, on October 29; Roland G. Hebert, Sr., 63, rotary driller at Imogene before his retirement, on October 9; Crawford H. Jackson, 66, pumper water station at Talco before his retirement, on November 9; William Edgar Jones, 58, loading rackman at Longview Station Humble Pipe Line Company before his retirement, on November 17; William Edward Jones, 64, pipeliner at Hearne Station Humble Pipe Line Company before his retirement, on October 1.

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HUMBLE OIL & REFINING COMPANY

P. O. Box 2180, Houston 1, Texas

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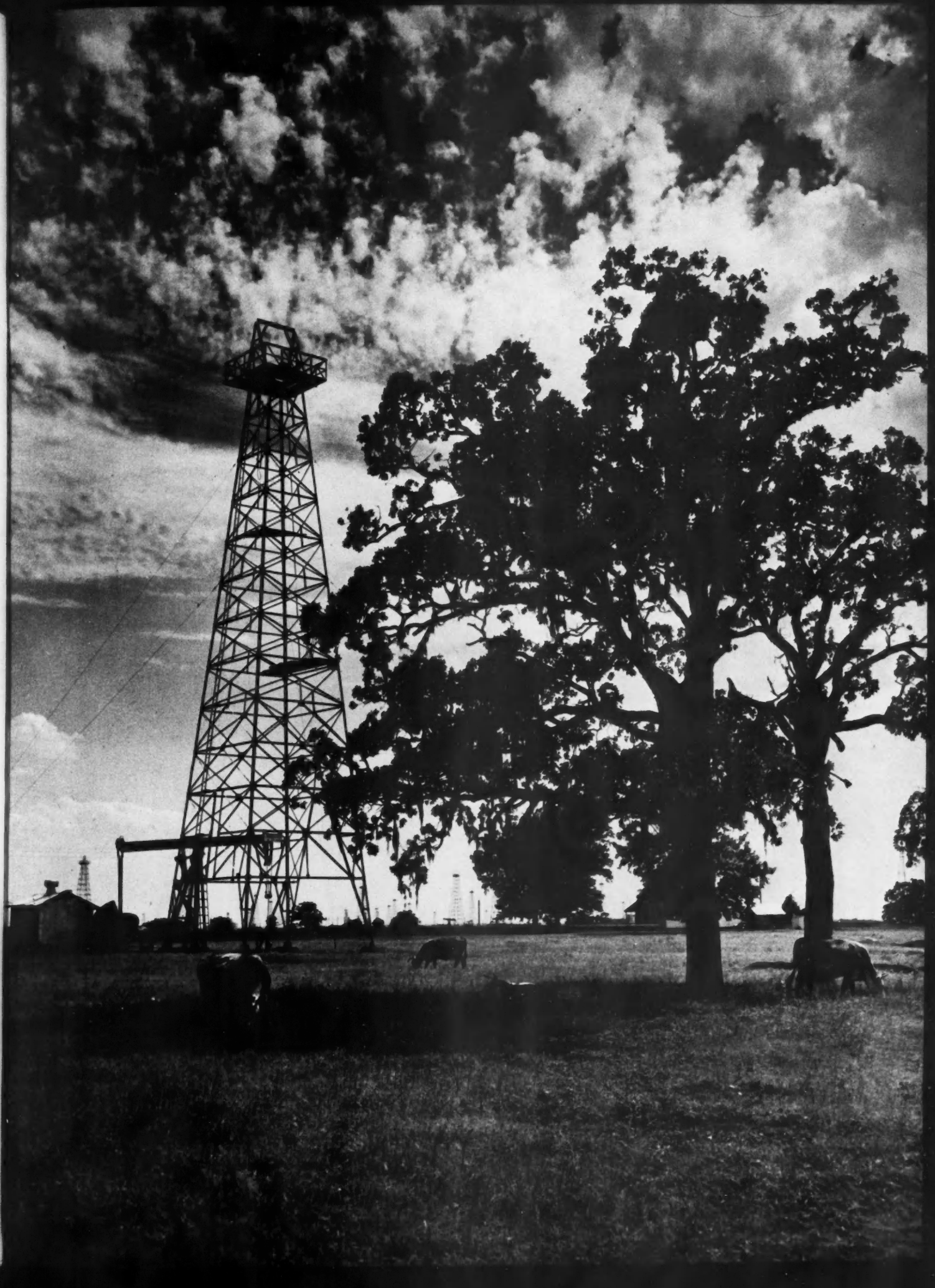
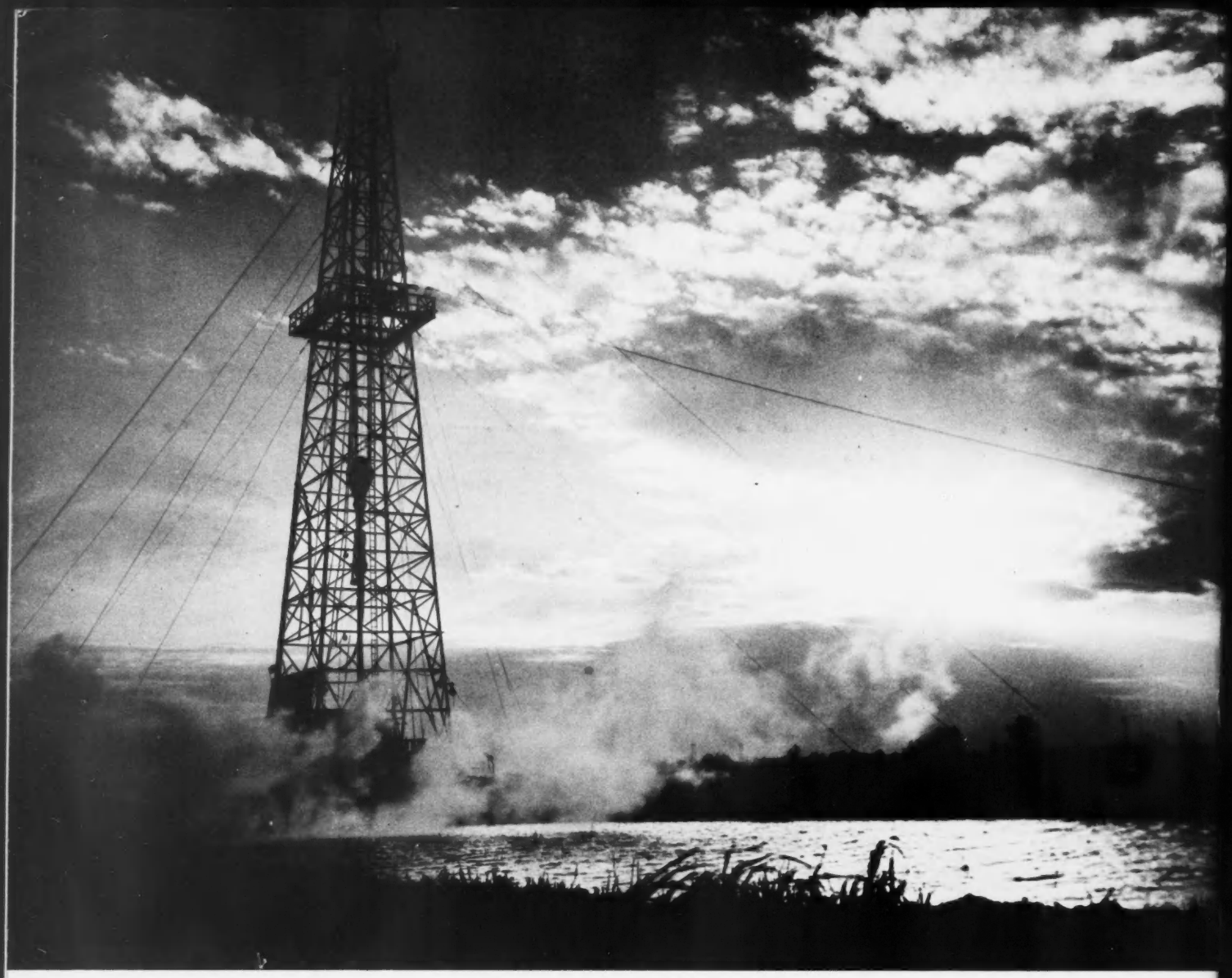
Cattle and derricks, symbols of two great industries in Texas, make this tranquil scene in Raccoon Bend field in Austin County.





Oil for Tomorrow

It takes money, research, time, and effort to replace oil that is being used at the rate of more than 6,000,000 barrels a day. In 1950 alone, the U. S. oil industry plowed back *more than two billion dollars* into the business of finding, producing, transporting, refining, and distributing oil as fast as the nation uses it.

Day and night, the work goes on—serving the public interest at all times, in peace and in war.

HUMBLE OIL & REFINING COMPANY